

What is claimed is:

1 1. A method for use in watermarking a video signal, the method comprising the
2 steps of:
3 replicating at least selected ones of bits of additional information to be impressed
4 upon a video signal by placing said bits into at least one selected bit of an average value
5 of a chrominance portion over a block of said video signal; and
6 supplying said original and replicated bits to be impressed in the same block
7 position in successive frames.

1 2. The invention as defined in claim 1 wherein said block position is based on said
2 video signal having one Y, one U and one V value for every 2x2 block of full resolution
3 of an original input video signal.

1 3. The invention as defined in claim 1 wherein all of said bits of additional
2 information that are to be impressed on a first one of said successive frames are replicated
3 to be impressed on at least a second one of said successive frames that is for display
4 without any frame being displayed between said first frame and said second ones of said
5 successive frames.

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1 4. The invention as defined in claim 1 further comprising the step of adding an
2 offset bias to an average value of a chrominance portion of at least one block of at least
3 one frame of said successive frames that have said original and replicated bits impressed
4 upon them in the same block positions.

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1 5. The invention as defined in claim 4 wherein said offset bias is independent of a
2 busyness measure of said block.

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1 6. The invention as defined in claim 4 wherein said offset bias is independent of
2 any value added to said average value to bring said average value within a safe range.

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1 7. The invention as defined in claim 4 wherein said offset bias is a first offset bias
2 that is a positive value added to a first one of said successive frames, and wherein said
3 method further comprises the step of adding a second offset bias to an average value of a
4 chrominance portion of at least one block of at least a second frame of said successive
5 frames that have said original and replicated bits impressed upon them in the same block
6 positions, said second offset bias being a negative value.

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1 8. The invention as defined in claim 4 wherein said offset bias is a first offset bias
2 that is a positive value added to a first one of said successive frames, and wherein said
3 method further comprises the step of adding a second offset bias to an average value of a
4 chrominance portion of at least one block of at least a second frame of said successive
5 frames that have said original and replicated bits impressed upon them in the same block
6 positions, said second offset bias being a negative value and said at least one block of
7 said at least second frame being like-positioned within said at least second frame as said
8 at least one block of said first frame.

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1 9. The invention as defined in claim 4 wherein said offset bias is small relative to
2 the change required in said average value to place said bits into said at least one selected
3 bit of an average value.

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1 10. The invention as defined in claim 4 wherein additions are made to the
2 chrominance portion of ones of the pixels of said at least one block until total of such
3 additions equals the product of said offset bias and the number of pixels in a block, said
4 additions being independent of any other changes made to the chrominance portion of
5 said ones of the pixels.

1 11. The invention as defined in claim 1 further comprising the step of including a
2 prescribed data sequence within said additional information to be impressed upon a
3 chrominance portion of said video signal.

1 12. The invention as defined in claim 11 wherein said prescribed data sequence is
2 known to a receiver of said video signal after it is watermarked.

1 13. The invention as defined in claim 11 wherein said prescribed data sequence is
2 a Barker sequence.

1 14. The invention as defined in claim 11 wherein said prescribed data sequence is
2 impressed, at least in part, upon prescribed blocks of at least one frame of said video
3 signal.

1 15. The invention as defined in claim 11 wherein said prescribed data sequence is
2 impressed in its entirety upon prescribed blocks of one frame of said video signal.

1 16. The invention as defined in claim 11 wherein said prescribed data sequence is
2 impressed upon like-positioned prescribed blocks of multiple ones of frames of said
3 video signal.

1 17. The invention as defined in claim 11 wherein replicas of said prescribed data
2 sequence in its entirety are impressed upon like-positioned prescribed blocks of
3 respective ones of multiple frames of said video signal.

1 18. The invention as defined in claim 1 further comprising the step of including a
2 known data sequence within said additional information to be impressed upon a
3 chrominance portion of said video signal, wherein said known data sequence is
4 intermixed among said additional information so as to be scattered among the blocks of a
5 frame.

1 19. The invention as defined in claim 1 further comprising the step of including a
2 known data sequence within said additional information to be impressed upon a
3 chrominance portion of said video signal, wherein said known data sequence is
4 intermixed among said additional information so as to be scattered among the blocks of a
5 frame, said scattering being different for different suppliers of said additional
6 information.

1 20. A method for use with a receiver of a video signal containing additional
2 information impressed upon a chrominance portion of said video signal, the method
3 comprising the step of:

4 combining extracted initial additional information of like block positions from
5 prescribed frames to determine the final additional information;
6 supplying as an output said final additional information.

1 21. The invention as defined in claim 20 wherein said prescribed frames are
2 successive frames.

1 22. The invention as defined in claim 20 wherein said prescribed frames are
2 successive frames as transmitted in said video signal.

1 23. The invention as defined in claim 20 wherein said prescribed frames are
2 successive frames when displayed.

1 24. The invention as defined in claim 20 further comprising the step of
2 determining a quality of each of said prescribed frames that are combined in said
3 combining step; and

4 wherein in said combining step said initial additional information of like block
5 positions from said prescribed frames is combined as a function of said determined
6 quality for each of said prescribed frames.

1 25. The invention as defined in claim 21 wherein said determined quality for each
2 of said frames is a function of the number of errors in each of said frames for a known
3 data sequence which is embedded in expected ones of the blocks of each of said frames.

1 26. The invention as defined in claim 21 wherein when said determined quality
2 for a frame is below a prescribed threshold, said frame is treated as if it contains no
3 additional information.

1 27. The invention as defined in claim 21 wherein said determined quality is
2 expressed as a weight value, one weight value being developed for each frame.

1 28. The invention as defined in claim 21 wherein said final additional
2 information is supplied to a channel decoder which treats said final additional
3 information as soft bits.

1 29. Apparatus for use in watermarking a video signal, comprising:
2 means for replicating at least selected ones of bits of additional information to be
3 impressed upon a video signal by replacing a selected bit of an average value of a
4 chrominance portion over a block of said video signal; and
5 means for supplying said original and replicated bits to be impressed in the same
6 block position in successive frames.

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1 30. A method for use in watermarking a video signal, the method comprising the
2 steps of:
3 inserting in prescribed block positions of prescribed frames of said video signal at
4 least one unique identifying code by replacing a selected bit of an average of a
5 chrominance portion over said blocks.

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1 31. The invention as defined in claim 30 wherein said identifying code is a
2 Barker sequence.

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1 32. The invention as defined in claim 30 wherein said prescribed code identifies
2 said prescribed frames as belonging to a unitary sequence.

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1 33. The invention as defined in claim 30 wherein said prescribed code identifies
2 said prescribed frames as belonging to a unitary sequence, and said method further
3 comprising the step of:
4 inserting in other prescribed block positions of said prescribed frames at least one
5 secondary unique identifying code by replacing a selected bit of an average of a
6 chrominance portion over said blocks.

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1 34. The invention as defined in claim 33 wherein said at least one secondary
2 unique identifying code is made up of a series of codes that distinctly identifies individual
3 frames of said prescribed frames.

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1 35. The invention as defined in claim 33 wherein said at least one secondary
2 unique identifying code is made up of a series of codes that distinctly identifies groups of
3 frames of said prescribed frames, at least one of said groups of frames including a
4 plurality of frames.

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1 36. A receiver for extracting additional information from a video signal
2 containing said non-video information impressed upon a chrominance portion of said
3 video signal, comprising
4 an extractor for extracting said non-video information from said video signal; and
5 a sequence processor receiving at least said extracted non-video information and
6 detecting at least one prescribed sequence that was impressed upon at least one frame of
7 said video signal

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1 37. The invention as defined in claim 36 wherein said sequence processor
2 determines a number of errors in said at least one prescribed sequence for each of a
3 plurality of grouped frames, said receiver further comprising:
4 a frame weighting unit which uses a per-frame quality measure derived as a
5 function of said number of errors in each of said plurality of frames to combine extracted
6 like-block positioned non-video information from said plurality of frames into an output
7 value for said block position for said grouped frames.

1 38. The invention as defined in claim 36 wherein said sequence processor
2 determines a number of errors in said at least one prescribed sequence for each of a
3 plurality of grouped frames, said receiver further comprising:
4 a frame weighting unit which uses a per-frame quality measure derived as a
5 function of said number of errors in each of said plurality of frames to combine extracted
6 like-block positioned non-video information from said plurality of frames into a soft data
7 output value for said block position for said grouped frames; and
8 a channel decoder for decoding said soft values.